

3 January 2005

SUBJECT: DETERMINATION OF THE SUITABILITY OF THE POST-DREDGE SEDIMENT SURFACE QUALITY RELATIVE TO THE WASHINGTON DEPARTMENT OF ECOLOGY'S ANTIDEGRADATION POLICY FOR THE LAKESIDE INDUSTRIES SAND AND GRAVEL SPILL REMOVAL DREDGING (2003-2-00198) AS EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT.

1. The following summary reflects the consensus determination of the Agencies that comprise the regional Dredged Material Management Program (DMMP) for the State of Washington. The agencies include the Corps of Engineers, Department of Ecology, Department of Natural Resources, and the Environmental Protection Agency. The agencies are charged with determining the suitability of the post-dredge sediment surface quality after dredging approximately 142 cubic yards of spilled sand and gravel to restore water depths for barges docking at the pier. The sand/gravel spill material was not tested, but was considered by the DMMP to be clean material using "best-professional-judgement". This material was dredged and subsequently disposed upland at an Ecology approved upland site. The DMMP agencies required a sediment quality assessment of the post-dredge sediment surface based on a "reason-to-believe" after Ecology's SEDQUAL Sediment Quality Database showed a nearby station with 15 chemical CSL exceedances.
2. The project was ranked high (Salmon Bay) for testing purposes, and the Corps permit special condition required a sediment quality assessment of the top 10 cm of surface sediment following dredging of the sand/gravel spill material. A van Veen grab was used to collect a representative composited sample of the surface material at a single location (Figures 1 and 2).
3. Relevant dates for regulatory tracking purposes are included in Table 1.

Table 1. Regulatory Tracking Information and Dates

Corps Permit #:	2003-2-00198
Initial SAP submittal date:	December 2, 2003
SAP approval letter date:	December 10, 2003
Sampling date(s):	November 5, 2004
Sediment data characterization report submittal date:	December 20, 2004
DAIS Tracking Number	LIPDS-1-A-O-205
Recency Determination Date: High (2 years)	December 2006

4. The Sampling and Analysis Plan was approved by the Agencies on December 10, 2003, and called for characterization of the sediment surface after the sand/gravel spill had been removed by barge mounted crane with upland disposal. The single sampling station occupied was relocated approximately 73 feet northwest of the location identified in the DMMP approved SAP because the material at the initial station consisted of gravel rather than native sediment. The single sampling location specified in the SAP was followed with the slight deviation mentioned previously, and quality assurance/quality control guidelines specified by the PSDDA Users Manual were generally complied with. The data gathered were deemed sufficient and acceptable for decision-making by the DMMP agencies based on best professional judgment.
5. Table 2 provides an analysis summary of the results of the conventional and chemical analyses for the single sample of surface material compared to DMMP and SMS chemical guidelines. Chemical analysis of the single sample indicated that from a DMMP perspective there were eleven detected screening level

exceedances (Acenaphene, Fluorene, Phenanthrene, 2-methylnaphthalene, Total LPAH, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Total HPAH, Dibenzofuran), four detection limit exceedances (Hexachlorobenzene and N-Nitrosodiphenylamine, 1,2-Dichlorobenzene, 1,2,4-Trichlorobenzene), and a single bioaccumulation trigger exceedance (Fluoranthene) of DMMP Guidelines. From an SMS perspective there were seven SQS exceedances (Naphthalene, Total HPAH, Benzo(a)anthracene, Benzo(a)pyrene, Total Benzo(a)fluoranthenes, Chrysene, and Indeno(1,2,3-cd)pyrene) and seven detected CSL exceedances (Total LPAH, Acenaphene, Fluorene, Phenanthrene, 2-Methylnaphthalene, Benzo (k) fluoranthenes, Dibenzofuran), and four undetected CSL exceedances (Hexachlorobutadiene, Hexachlorobenzene, Butylbenzylphthalate, and 2,4-Dimethylphenol) within the sediment surface. TOC was quantitated at 0.7 %. No biological testing was performed on this sample, and therefore from a DMMP perspective, the new exposed sediment surface represents a degraded sediment quality compared to the predredging surface. From an SMS perspective the sediment quality exceeds the Washington Department of Ecology's anti-degradation standard using Best-Professional-Judgement (BPJ).

6. The results of the single composited surface sample representing the post-dredge sediment surface layer failed to meet acceptable state sediment quality guidelines as specified by the PSDDA program (http://www.nws.usace.army.mil/publicmenu/DOCUMENTS/Antidegradation_Clarif.pdf), which is the Washington State anti-degradation policy.
7. This memorandum documents the sediment quality of the post-dredge sediment surface after restoring barge berthing depths at the Lakeside Industries Pier, and shows that the sediment quality is not in compliance with the DMMP/PSDDA post-dredge sediment quality standard, which is the State of Washington's anti-degradation policy. The DMMP agencies will coordinate this finding with the Ecology Cleanup Program for any follow-up action necessary to bring the surface sediment quality into compliance with the State of Washington's anti-degradation policy. This may require additional work to remediate the sediment surface quality by either additional dredging or placing a CAP.

Concur:

1/3/2005
Date

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David Kendall, Ph.D., Seattle District Corps of Engineers

FEB 16, 2005
Date

Thomas H. Gries
Tom Gries/Cinde Donoghue, Washington Department of Ecology

2/15/05
Date

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2/16/05
Date

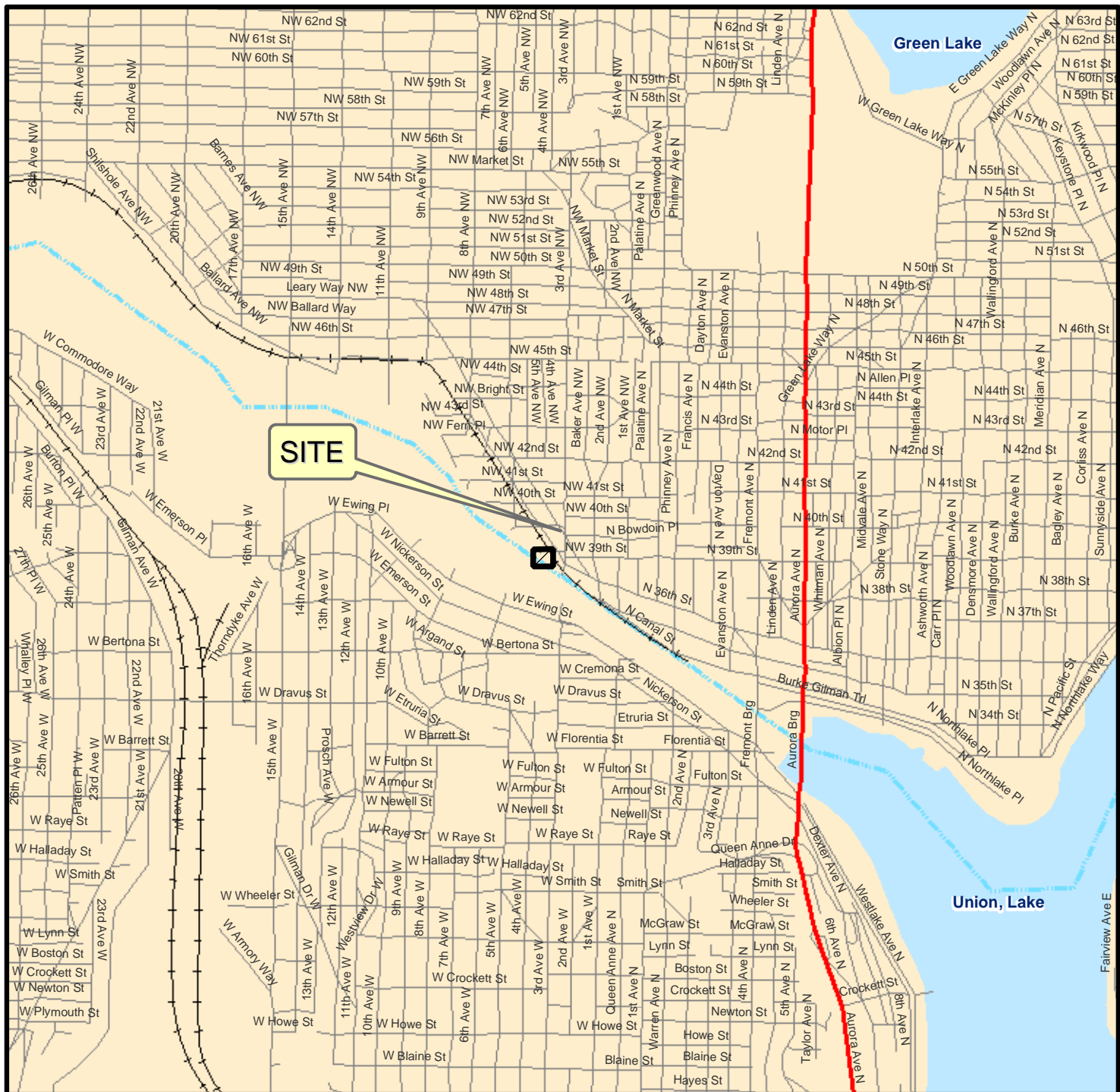
Jonathan R. Freedman
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2/15/2005
Date

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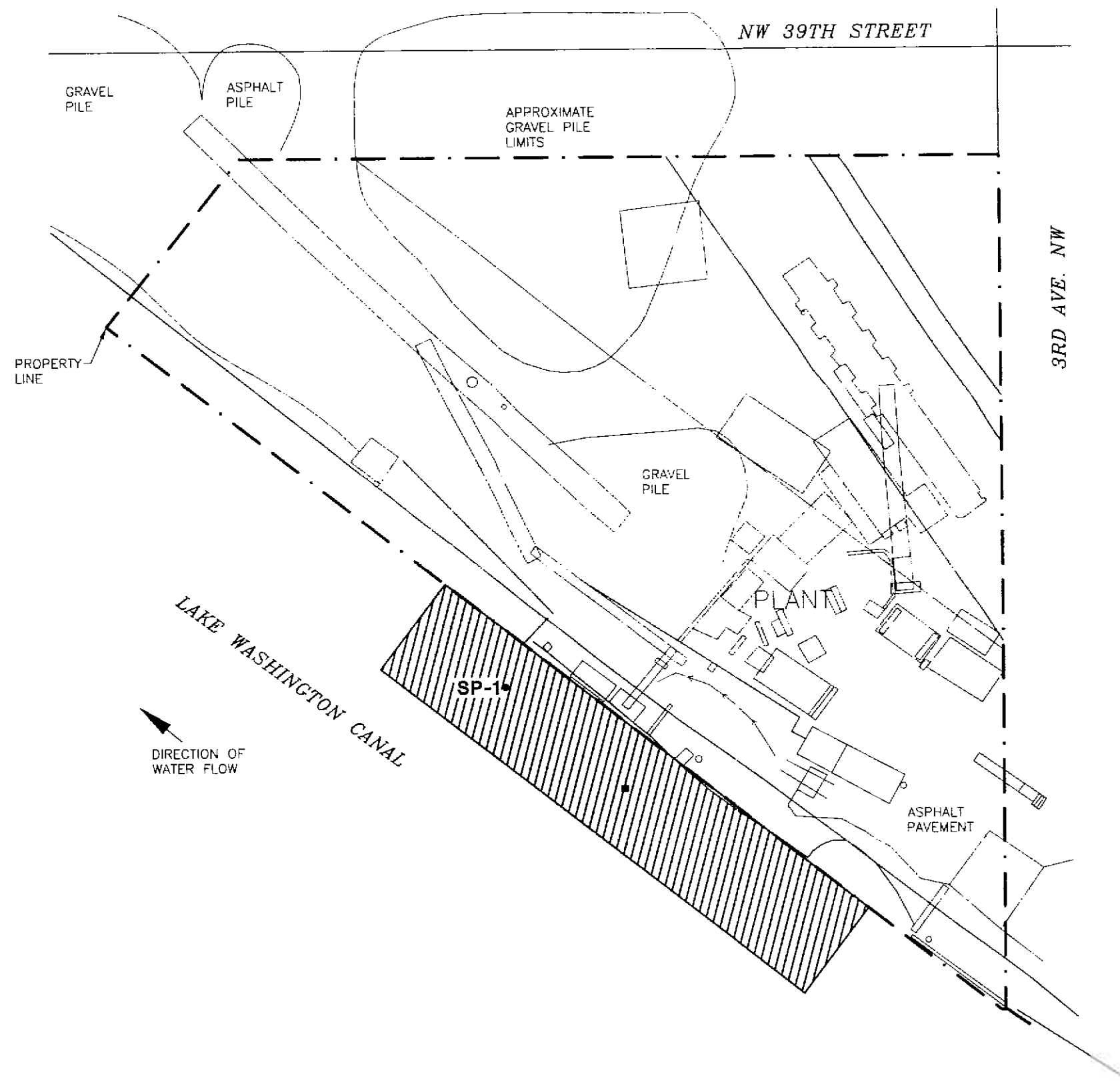
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DMMO File



12/09/04

VPE:SLF:SCY

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Notes: 1. The locations of all features shown are approximate.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
Reference: Drawing created from sketch provided by GeoEngineers' personnel.

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DREDGING AREA AND SAMPLING LOCATION

FIGURE 2

Table 2. Lakeside Industries Post-Dredge Surface Sediment Quality DMMP/SMS Comparison Summary

CHEMICAL NAME	DMMU ID:						SP-1			
	DMMP				SMS		mg/kg-dry wgt	mg/kg-OC	VQ	
	Units	SL	BT	ML	Units	SQS	CSL	DMMP		SMS
Antimony		150		200				6.0		u
Arsenic	mg/kg	57	0.5071	700	mg/kg	57	93	6.0		u
Cadmium	mg/kg	5	11.3	14	mg/kg	5.1	6.7	0.20		
Chromium	mg/kg	(2)	267	(2)	mg/kg	260	270	29.4		
Copper	mg/kg	390	1,027	1,300	mg/kg	390	390	40.6		
Lead	mg/kg	450	975	1,200	mg/kg	450	530	11.0		
Mercury	mg/kg	0.41	1.5	2.3	mg/kg	0.41	0.59	0.06		u
Nickel	mg/kg	140	370	370	mg/kg	--	--	30.0		
Selenium	mg/kg	(2)	3	(2)	mg/kg	--	--	6.0		u
Silver	mg/kg	6.1	6.1	8.4	mg/kg	6.1	6.1	0.4		u
Zinc	mg/kg	410	2,783	3,800	mg/kg	410	960	66.1		
TBT ion (porewater)	ug/L	0.15	0.15		ug/L	0.05	0.35	NA		
Naphthalene	mg/kg	2.1		2.4	mg/kg-OC	99	170	0.60	100	
Acenaphthylene	mg/kg	0.56		2.0	mg/kg-OC	66	66	0.07	11	
Acenaphthene	mg/kg	0.50		2.0	mg/kg-OC	16	57	1.9	317	
Fluorene	mg/kg	0.54		3.6	mg/kg-OC	23	79	1.5	250	
Phenanthrene	mg/kg	1.5		21	mg/kg-OC	100	480	4.0	568	
Anthracene	mg/kg	0.96		13.0	mg/kg-OC	220	1,200	0.67	112	
2-Methylnaphthalene	mg/kg	0.67		1.9	mg/kg-OC	38	64	1.2	200	
Total LPAH	mg/kg	5.2		29	mg/kg-OC	370	780	9.9	1,458	
Fluoranthene	mg/kg	1.7	4.6	30	mg/kg-OC	1,000	1,400	5.2	868	E
Pyrene	mg/kg	2.6	11.98	16	mg/kg-OC	1,000	1,400	3.8	634	
Benzo(a)anthracene	mg/kg	1.3		5.1	mg/kg-OC	110	270	1.5	250	
Chrysene	mg/kg	1.4		21.0	mg/kg-OC	110	460	1.8	301	
Benzo(k)fluoranthenes	mg/kg				mg/kg-OC	31	78		119	
Benzo(fluoranthenes (b+k)	ug/kg	3.2		9.9	mg/kg-OC	230	450	2.01	336	
Benzo(a)pyrene	ug/kg	1.6		3.6	mg/kg-OC	99	210	0.82	137	
Indeno(1,2,3-cd)pyrene	mg/kg	0.6		4.4	mg/kg-OC	34	89	0.39	65	
Dibenzo(a,h)anthracene	mg/kg	0.23		1.9	mg/kg-OC	34	88	0.16	27	
Benzo(g,h,i)perylene	mg/kg	0.67		3.2	mg/kg-OC	31	78	NA		
Total HPAH	mg/kg	12		69	mg/kg-OC	960	5,300	17.7	2,618	
1,3-Dichlorobenzene	mg/kg	0.17			mg/kg-OC	--	--	0.057		u
1,4-Dichlorobenzene	mg/kg	0.11		0.120	mg/kg-OC	3	9	0.057		u
1,2-Dichlorobenzene	mg/kg	0.035		0.110	mg/kg-OC	2.3	2.3	0.057		u
1,2,4-Trichlorobenzene	mg/kg	0.031		0.064	mg/kg-OC	0.81	1.8	0.057		u
Hexachlorobenzene (HCB)	mg/kg	0.022	0.168	0.23	mg/kg-OC	0.38	2.3	0.057	10	u
Dimethylphthalate	mg/kg	1.4			mg/kg-OC	53	53	0.057	10	u
Diethylphthalate	mg/kg	1.2			mg/kg-OC	61	110	0.057	10	u
Di-n-butylphthalate	mg/kg	5.1			mg/kg-OC	220	1,700	0.057	10	u
Butylbenzylphthalate	mg/kg	0.97			mg/kg-OC	4.9	64	0.057	10	u
Bis(2-ethylhexyl)phthalate	mg/kg	8.3			mg/kg-OC	47	78	0.110	18	
Di-n-octylphthalate	mg/kg	6.2			mg/kg-OC	58	4,500	0.057	10	u
Phenol	mg/kg	0.420		1.20	mg/kg	0.42	1.2	0.057	57	u
2-Methylphenol	mg/kg	0.063		0.077	mg/kg	0.063	0.063	0.057	57	u
4-Methylphenol	mg/kg	0.670		3.60	mg/kg	0.67	0.67	0.057	57	u
2,4-Dimethylphenol	mg/kg	0.029		0.21	mg/kg	0.029	0.029	0.057	0.057	u
Pentachlorophenol	mg/kg	0.400		0.69	mg/kg	36	0.69	0.28	280	u
Benzyl alcohol	mg/kg	0.057		0.87	mg/kg	57	73	0.057	57	u
Benzoic acid	mg/kg	0.650		0.76	mg/kg	650	650	0.570	570	u
Dibenzofuran	mg/kg	0.54		1.7	mg/kg-OC	15	58	0.94	157	
Hexachloroethane	mg/kg	0.600		1.60	mg/kg-OC					
Hexachlorobutadiene	mg/kg	0.029		0.27	mg/kg-OC	3.9	6.2	0.001	10	u
N-Nitrosodiphenylamine	mg/kg	0.028		0.13	mg/kg-OC	11	11	0.057	10	u
Trichloroethene	mg/kg	0.160		1.60	ug/kg	--	--			
Tetrachloroethene	mg/kg	0.057		0.21	ug/kg	--	--			
Ethylbenzene	mg/kg	0.010		0.05	ug/kg	--	--			
Total Xylene (sum of o-, m-, p-)	mg/kg	0.040		0.16	ug/kg	--	--			
Total DDT (sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT)	mg/kg	0.0069	0.05	0.069	mg/kg-OC	--	--	0.002		u
Aldrin	mg/kg	0.010			mg/kg-OC	--	--	0.001		u
Chlordane	mg/kg	0.010	0.037		mg/kg-OC	--	--	0.003		y
Dieldrin	mg/kg	0.010			mg/kg-OC	--	--	0.002		u
Heptachlor	mg/kg	0.010			mg/kg-OC	--	--	0.001		u
Alpha-BHC	mg/kg		0.010		mg/kg-OC	--	--			
Gamma-BHC (Lindane)	mg/kg	0.010			mg/kg-OC	--	--	0.001		u
Total PCBs	mg/kg	0.13	38***	3.1	mg/kg-OC	12	65	0.019		u
Total Solids	%							80.0		
Total Volatile Solids	%							2.0		
Total Organic Carbon	%							0.6		
Total Ammonia	mg/kg							3.6		
Total Sulfides	mg/kg							2.4		
Gravel	%							38.0		
Sand	%							55.2		
Silt	%							6.2		
Clay	%							0.6		
Fines (percent silt + clay)	%							6.8		
Bioassay Determination: (P/F)								NA		
BTs eyesceded:								yes		
Bioaccumulation conducted:								no		
ML Rule exceeded:								no		
PSDDA Determination:								F(B)	FAIL (CSL)	
DMMU Volume:	cy							NA		
Rank								High		
Mean Core sampling depth	ft							10 cm		
Maximum sampling depth (mudline)								10 cm		
DMMU ID:								SP-1		

Legend:

SL = Screening Level exceedance

BT = Bioaccumulation Trigger exceedance

P = Pass (Suitable for UCOWD)

F(B) = Failure (UCOWD Unsuitable w/o biological testing)

SOS = Sediment Quality Standards exceedance (SMS)

CSL = Cleanup Screening Level exceedance (SMS)

VQ = Validation Qualifier

UCOWD = Unconfined open-water disposal

U = undetected at the reported concentration

E = positively ID'd, estimated concentration

TABLE 1
SUMMARY OF CHEMICAL ANALYTICAL DATA¹
FOR SAMPLE SP-1 RELATIVE
TO SMS² CRITERIA

Chemical	SP-1	SMS Criteria	
		SQS ³	CSL ³
Conventionals (dry weight)			
Total Solids (%)	80	--	--
Total Volatile Solids (%)	2	--	--
Total Organic Carbon (%)	1	--	--
Ammonia (mg/kg)	4	--	--
Total Sulfides (mg/kg)	2	--	--
Metals ³ (mg/kg dry weight)			
Antimony	6 U	--	
Arsenic	6 U	57	93
Cadmium	0 U	5.1	6.7
Chromium	29	260	270
Copper	41	390	390
Lead	11	450	530
Mercury	0 U	0.41	0.59
Nickel	30	--	--
Selenium	6 U	--	--
Silver	0 U	6.1	6.1
Zinc	66	410	960
Organics (mg/kg OC) ⁴			
LPAH			
Total LPAH ⁵	1,458	370	780
Acenaphthylene	11	66	66
Acenaphthene	317	16	57
Anthracene	112	220	1,200
Fluorene	250	23	79
Naphthalene	100	99	170
Phenanthrene	668	100	480
2-Methylnaphthalene	200	38	64
HPAH (mg/kg OC) ⁴			
Total HPAH ⁶	2,618	960	5,300
Benzo(a)anthracene	250	110	270
Benzo(a)pyrene	137	99	210
Benzo (b) fluoranthene	217	230	450
Benzo (k) fluoranthene	119	31	78
Total Benzo(a)fluoranthenes ⁷	336	110	460
Benzo(ghi)perylene		12	33
Chrysene	301	160	1,200
Dibenzo(a,h)anthracene	27	34	88
Fluoranthene	868 D	1,000	1,400
Indeno(1,2,3-cd)pyrene	65	34	89
Pyrene	634	1,000	1,400
Miscellaneous Extractables			
Dibenzofuran (mg/kg OC) ⁴	157	15	58
Hexachlorobutadiene (mg/kg OC) ^{4,9}	10 U	3.9	6.2
N-Nitrosodiphenylamine (mg/kg OC) ⁴	10 U	11	11
Benzoic Acid (µg/kg dry weight) ⁸	570 U	650	650
Benzyl Alcohol (µg/kg dry weight) ⁹	57	57	73

Notes appear on Page 2

TABLE 1 (Page 2 of 2)

Chemical		SMS Criteria	
		SQS	CSL
Chlorinated Hydrocarbons (mg/kg OC) ⁴			
Hexachlorobenzene ⁹	10 U	0.38	2.3
1,2-Dichlorobenzene	0 U	2.3	2.3
1,3-Dichlorobenzene	0 U	--	--
1,4-Dichlorobenzene	0 U	3.1	9
1,2,4-Trichlorobenzene	1 U	0.81	1.8
Phthalates (mg/kg OC) ⁴			
Bis(2-ethylhexyl)phthalate	18	47	78
Butyl benzyl phthalate ⁹	10 U	4.9	64
Diethyl phthalate	10 U	61	110
Dimethyl phthalate	10 U	53	53
Di-n-butyl phthalate	10 U	220	1,700
Di-n-octyl phthalate	10 U	58	4,500
PCBs (mg/kg OC) ⁴			
Total PCBs	3 U	12	65
Phenols (µg/kg dry weight) ⁸			
Pentachlorophenol	280 U	360	690
Phenol	57 U	420	1,000
2 Methylphenol	57 U	63	63
4 Methylphenol	57 U	670	670
2,4-Dimethylphenol ⁷	57 U	29	29

Notes:

¹ Chemical analysis performed by Analytical Resources Incorporated (ARI) of Tukwila, Washington.

² SMS = Sediment Management Standards (WAC 173-204) SQS = Sediment Quality Standards
MC = Maximum Chemical Criteria/Minimum Cleanup Levels

³ Results are reported as milligrams per kilograms (dry weight).

⁴ Results have been normalized to the total organic carbon content of the sample and are reported as milligrams per kilogram OC.

⁵ Total LPAH = The sum of acenaphthylene, acenaphthene, anthracene, fluorene, naphthalene, and phenanthrene.

⁶ Total HPAH = The sum of benzo(a)anthracene, benzo(a)pyrene, total benzofluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene.

⁷ The total benzofluoranthenes is the sum of the concentrations of the b and k isomers of benzofluoranthene.

⁸ Results are reported as micrograms per kilogram (dry weight).

⁹ Analyte was not detected at the reported concentrations however, the reported concentration is greater than the SMS criteria for the analyte.

HPAH = high molecular weight polycyclic aromatic hydrocarbon

LPAH = low molecular weight polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

"--" = Not Established

U = Undetected

D = Diluted

mg/kg = milligrams per kilogram

µg/kg = micrograms per kilogram

Bolded text indicates that the concentration is greater than the SQS criteria.

Bolded text and shading indicate that the concentration is greater than the CSL criteria.

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